REMARKS

This is in response to the Office Action dated August 10, 2006. Claims 1-44 are currently pending.

Claims 1-5, 8–13, 19–27, 31, 34–37, and 40-44 stand rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over Eller in view of either Kitano or Belding. This Section 103(a) rejection is respectfully traversed for at least the following reasons.

A general concept behind certain example embodiments of this invention of a method and apparatus for reducing relative humidity of inside air inside an enclosed space is described in the present application at paragraphs [0016 – 0018] as follows:

> [0016] Raising the temp of air 10.degree. C. will reduce the relative humidity of the air by about 50%. By sensing the relative humidity of the air at a sensing location at the air intake, the air stream outlet, somewhere inside the enclosed space, or at a combination of locations, a heat controller can be operated to supply heat at the proper rate to achieve a desired relative humidity in the air stream, and thus in the enclosed space.
>
> [0017] The relative humidity of the air is an indicator of how much water the air is holding, and thus how much more water it can hold. For example, in a closed room with standing water on the floor, the relative humidity would approach 100% (i.e. the air would become saturated with water) and so no more water would evaporate off the floor. Raising the air temp 10C will reduce the relative humidity by 50%, resulting in a humidity gradient between the water and the air, and thus more water will evaporate off the floor and the relative humidity will again rise to 100%, provided no air moves in or out of the room. By bringing in a dryer air stream and thereby pushing the wet air out of the room through an exhaust, the water is literally carried out of the room by the exhaust air with the result that all the water will eventually evaporate and be carried out of the room.

[0018] By sensing relative humidity and controlling the temperature of the air stream in response to the relative humidity, the invention can be used to control the relative humidity in an enclosed space, thereby providing drying at a fast rate in a flooded space for example, or maintaining the relative humidity in a building under construction at a desired level.

Thus Claim 1 reads:

A method of reducing a relative humidity of inside air inside an enclosed space, the method comprising:

drawing outside air from outside the enclosed space to create an air stream discharging into the enclosed space;

allowing an amount of air substantially corresponding to the air stream to escape from the enclosed space;

sensing the relative humidity of the air in at least one sensing location;

in response to the relative humidity sensed at the at least one sensing location, raising a temperature of the outside air drawn in as required to lower the relative humidity of the air stream such that the relative humidity of the inside air is substantially maintained at a desired relative humidity.

Air is drawn in from outside, heated to reduce its relative humidity thereof, and directed into the enclosed space, and a substantially equal amount of air already in the enclosed space is allowed to escape from the space in certain example embodiments of this invention. Thus, drier air moves into the space and wetter air moves out, thereby reducing the relative humidity in the space in certain example embodiments of this invention.

Claim 10 reads:

10. An apparatus for reducing a relative humidity of inside air inside an enclosed space, the apparatus comprising:

a portable outside air heat exchanger unit comprising:

a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;

a temperature adjusting element located in the air stream;

wherein the intake is adapted to draw air from outside the enclosed space and the outlet is adapted to discharge the air stream into the enclosed space;

a heating source connectable to the heat exchanger unit and operative to supply heat energy to the temperature adjusting element in response to directions from a heat controller;

at least one humidity sensor operative to sense the relative humidity of the air in a sensing location and to send a humidity signal to the heat controller;

wherein the heat controller is operative to receive the humidity signal and change the amount of heat energy supplied to the temperature adjusting element in response to the humidity signal.

Prior art to Eller:

As pointed out in our prior response, Eller states at column 9, lines 6 – 14: "[t]he conditioning unit 50 includes an evaporation coil 60 which cools the air to a temperature below its dew point, such that the air is cooled and moisture in the air simultaneously condenses on the coil 60 and it is removed via condensate line 61. The conditioning unit 50 may also include an air stream condensor coil 62, which reheats the dehumidified air to a desired temperature utilizing heat recaptured from the dehumidification process." Eller further states at column 4, line 65 to column 5, that "[t]he dehumidification unit preferably operates in conjunction with the refrigeration unit to cool the air to a temperature below its dew point, so that water vapor condenses on the cooling coils and is removed by a drain line."

Thus, Eller reduces the relative humidity of air by actually removing moisture from the air by cooling and condensing the moisture and removing it by a condensate line. Certain example embodiments of this invention are directed at reducing the relative humidity in the space. No water needs to be removed from the air, only the temperature of the air is increased which in turn reduces the relative humidity, a measure of the water absorbing capacity of the air, in certain example embodiments of this invention.

Prior art to Kitano:

The Examiner also cites Kitano as disclosing, a controller to control the temperature and humidity of air passing through wherein the temperature of the air is heated to the temperature of approximately 23 degrees C, and the relative humidity is lowered to approximately 40%. The Examiner cites in particular column 9, lines 27 – 29 and lines 37 – 40. Kitano states at column 9, lines 27 – 40, that

> "[t]he air in the chamber 140a is heated by the heater 142 up to a temperature of approx. 23.degree C. The humidifier 144 is provided with a heater 145, power supply 146, and evaporating dish 147. The heater 145 is connected to the power supply 146 so as to heat the evaporating dish 147. Demineralized water is supplied onto the evaporating dish 147 from a water supply source 168 through a line 169. When the evaporating dish 147 is heated by the heater 145, the demineralized water on the evaporating dish 147 is evaporated to produce water vapor 148. The water vapor 148 is added to the air in the chamber 140a so that the air with a humidity of approx. 40% goes out of the chamber 140a through an exit 149."

Thus, Kitano is disclosing a humidifier for adding moisture to the air, and thus *increasing* the relative humidity of the air. As the Examiner says, Kitano discloses a system for controlling

temperature and humidity, but does it by adding moisture. Further, in certain example embodiments of this invention, relative humidity is controlled – the temperature is not or need not be controlled since it must be varied to maintain the relative humidity at the desired level.

Prior art of Belding et al.

The Examiner states that Belding discloses a high temperature process air is required to lower the humidity of the system. The Abstract of Belding states, in part:

> "In the method, process air is passed through the enthalpy wheel to remove heat and moisture therefrom, and the enthalpy wheel is regenerated by passing air therethrough to remove heat and moisture therefrom. Thereafter, the method includes providing an adsorption wheel having a multiplicity of passages through which the process air from the enthalpy wheel can flow for adsorbing moisture, the wheel capable of adsorption of moisture from the process air and of regeneration. Process air from the enthalpy wheel is passed through the adsorption wheel to remove moisture, and the adsorption wheel is regenerated by passing hot gases therethrough to remove moisture..."

and at column 5, lines 5 – 18, that:

> "As air, such as moisture-laden air, is passed through desiccant wheel 8, moisture is removed from the air stream to provide a moisture-depleted stream which passes along line 14, through fan 10 and along line 16. All or a portion of the moisture-depleted stream of process air is passed through heat exchanger 18. As air passes through desiccant wheel 8, the air becomes heated by virtue of heat of absorption of the moisture on the desiccant. Further, because desiccant wheel 8 is heated for regenerative or desiccant drying purposes, air passing therethrough becomes heated. Thus, the air leaving desiccant wheel 8 along line 14 is at a much higher temperature, e.g., 175.degree. F. in certain sections, than the outdoor ambient air."

Thus it is clear that Belding again controls temperature and humidity but here utilizes yet another different well known system for removing moisture from air – a desiccant wheel. As air passes through the desiccant wheel, the air becomes heated by virtue of heat of absorption of the moisture into the desiccant. A means for then cooling the air is described. Again, the temperature rises as a result of the removal of water from the air.

In contrast, in certain example embodiments of the instant invention, the air is heated to reduce the relative humidity, however no water needs to be actually removed from the air stream.

With respect to Claims 1 and 10

The Applicant respectfully submits that the above shows that the prior art teaches away from the present invention. Eller and Belding teach reducing the moisture content of air by removing water therefrom, either by condensing the same as in Eller, or by passing the air through a desiccant wheel as in Belding. The prior art of Kitano in fact teaches a humidifier for *adding* moisture to the air, and thus *increasing* the relative humidity of the air, rather than a system for reducing the relative humidity in an enclosed space.

The Examiner states in the *Response to Arguments* that: "...the method of controlling relative humidity of an enclosed space of Eller et al since it is an effective means to remove moisture in the hot air stream passing therethrough, hence, providing cooled process air with a controlled level of humidity." However, claims 1 and 10 do not state "cooled process air with a controlled level of humidity". The air is in fact heated, if anything, and modifying the prior art of Eller, Kitano, or Belding as suggested by the Examiner would destroy the function of the prior

art for its stated purpose. Because modifying the cited art in the manner alleged in the Office Action would destroy the functionality and operation of the cited art, the Section 103(a) rejection is fundamentally flawed as a matter of law and should be withdrawn.

Eller discloses improved techniques for improving the environment of hazardous material abatement personnel operating within an enclosed working area while conducting, for example, asbestos removal operations. A negative pressure is established within the working area by a portable air moving unit, which exhausts air from the working area to prevent hazardous material leakage. The exhausted air is filtered, a significant portion of the exhausted air is conditioned by a portable refrigeration, heating and dehumidification system, and the temperature controlled air is returned to the working area. The present claimed invention requires that the temperature of the incoming air be adjusted to attain a desired relative humidity, without regard to the temperature of the air in the enclosed space. Eller requires that the temperature of the air be controlled. Modifying the Eller system to allow the temperature to change as required to attain a desired relative humidity would not permit the temperature of the air to be controlled, and thus would destroy the function of the Eller system.

Kitano discloses a system with a temperature/humidity controller communicating with the purification section and the upper spaces to control the temperature and humidity of the air passing through the purification sections. Again modifying the Kitano system to allow the temperature to change as required to attain a desired relative humidity, as in the claimed invention, would not permit the temperature of the air to be controlled, and thus would destroy the function of the Kitano system.

Belding discloses a method of conditioning a process stream of air in an air conditioning system wherein a process stream of air is dehumidified and cooled to provide a conditioned

stream of air for introducing to a conditioned space. The present claimed invention requires that the temperature of the incoming air be adjusted to attain a desired relative humidity, without regard to the temperature of the air in the enclosed space. Conditioning, as disclosed in Belding, requires that both temperature and humidity be adjusted to "provide a conditioned stream of air for introducing to a conditioned space". Modifying the Belding system to allow the temperature to change as required to attain a desired relative humidity, as in the claimed invention, would not permit the temperature of the air to be controlled, and thus would destroy the function of the Belding system.

In view of the above the Applicant respectfully submits that the Examiner has not established a prima facie case of obviousness with respect to Claims 1 and 10 and the Applicant requests that the rejection be withdrawn.

With respect to Claim 31

Claim 31 reads:

31. An apparatus for drying and scrubbing inside air inside an enclosed space, the apparatus comprising:

a portable heat exchanger unit comprising:

a fan operative to create an air stream by drawing air from an intake and discharging the air through an outlet;

a temperature adjusting element located in the air stream;

a HEPA filter capable of High Efficient Particulate Attenuation located such that the air stream passes through the HEPA filter;

a coarse filter located upstream from the HEPA filter such that the air stream passes through the coarse filter prior to passing through the HEPA filter;

a heating source connectable to the heat exchanger unit and operative to supply heat energy to the temperature adjusting element in response to directions from a heat controller.

Claim 31 adds a filtering capability to a heating apparatus, e.g., for reducing the relative humidity of an enclosed space, and submits that the arguments above apply to Claim 31, and that the Examiner has not established a prima facie case of obviousness with respect to Claim 31. The Applicant respectfully requests that the obviousness rejection be withdrawn.

Conclusion

Applicant believes that claims 1 - 44 are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

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By: _____

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